

PATENT SPECIFICATION

708,242

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COMPLETE SPECIFICATION.

Improvements in or relating to Glass Panels.

We, NATIONAL RESEARCH DEVELOPMENT CORPORATION, a British Corporation established by Statute, of 1 Tilney Street, London, W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to laminated or "safety" glass panels for windscreens and windows.

Trouble having been experienced with such panels due to rigid bolting of the panels to supporting members, it has already been proposed to mount aircraft windscreen panels in the frames by means of clamping bolts passing through margins of the plastic layer or layers of the glass/plastic sandwich, which project beyond the edges of the glass sheets. Although this expedient reduces the risk of breakage of the panel due to vibration of the frame, to mechanical shock or to differential expansion of panel and frame, there is still the danger of tearing of the margins of the plastic material and of their becoming deformed due to creep, especially under tropical conditions.

According to the invention a laminated glass panel has at least three plastic material core layers sandwiched between two glass layers and along part at least of the periphery of the panel at least one intermediate layer of the core terminates some distance from the edges of the glass panels, whilst two outer layers at least of the core extend some distance beyond the edges of the glass panels, at least one layer of fibrous material impregnated with plastic setting material being interposed as a reinforcement between the margins of said extending layers of the core and abutting against the edge(s) of said

intermediate layer(s) of the core and secured adhesively in position.

If desired further alternate layers of plastic material and of fibrous material impregnated with plastic setting material may be built up upon the outer faces of the projecting margins of the extending layers of the core, some of these built up layers abutting against the edges of the glass panels and some of them extending over the outer faces of the margins of the glass panels, all said layers being secured adhesively in position.

The plastic material of the core layers may be of any type commonly used in laminated safety glass panels and the plastic setting material with which the fibrous material is impregnated may be of any convenient, e.g. thermo-setting, type capable of setting from liquid form.

Laminated glass panels, suitable for use on or in aircraft windscreens, in accordance with two forms of the invention are illustrated by Figures 1 and 2, respectively, of the accompanying diagrammatic drawings which are fragmentary sectional views in which the thicknesses are exaggerated for the sake of clearness.

In the case of the Figure 1 example, the panel has two outer layers 11 and 12 of glass and four core layers 13, 14, 15, 16 of polyvinyl butyral sheet all secured adhesively together in known manner. The edges of the two inner layers 14, 15 of the core lie between the two glass layers 11, 12 some distance from the edges of the latter, but the two outer layers 13, 16 of the core extend some distance beyond the edges of the glass layers 11, 12 as indicated at 13a, 16a. Between these margins of the outer core layers 13, 16 is accommodated a strip of glass fibre cloth 17 which extends from

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the edges of the inner core layers 14, 15 between the glass layers 11, 12 to the edges of the outer core layers 13, 16 and is secured adhesively to the margins of the latter. This glass fibre cloth 17 may be impregnated with or embedded in polyvinyl butyral which may be united integrally (by suitable heat and pressure) with that of the outer core layers 13, 16 and preferably with that of the inner core layers 14, 15 as well. It is not essential, however, that the glass fibre cloth 17 be impregnated with the same material as that of the core layers 13, 14, 15, 16.

As shown in Figure 2, a laminated glass panel comprises two outer layers 21, 22 of glass and four core layers 23, 24, 25, 26, of polyvinyl butyral. As in the case of Figure 1, the outer core layers 23, 26 extend beyond the edges of the glass layers 21, 22 as indicated at 23a, 26a and a strip 27 of glass fibre cloth accommodated between their margins abuts against the edges of the inner core layers 24, 25 between the glass layers 21, 22. In the case of Figure 2, however, further alternate layers of glass fibre cloth 28—33 and of polyvinyl butyral 34—39 are added, the layers 28, 34, 30 and 29, 35, 31 abutting against the edges of the glass sheets 21, 22, respectively, and the remaining layers 36, 32, 38 and 37, 33, 39, being wider and extending over the margins of the glass sheets 21, 22 to which the polyvinyl butyral layers 36 and 37, respectively, are secured adhesively.

The glass fibre cloth layers 27—33 are secured adhesively to the polyvinyl butyral layers 23—26, 34—39 respectively as shown and any or all of the glass fibre cloth layers 27—33 may be impregnated with or embedded in polyvinyl butyral which may

be united integrally with that to which the glass cloth layers adhere, so that there may in effect be one mass of polyvinyl butyral with pieces of glass cloth reinforcement embedded therein.

What we claim is:—

1. A laminated glass panel having at least three plastic material core layers sandwiched between two glass layers and in which along part at least of the periphery of the panel at least one intermediate layer of the core terminates some distance from the edges of the glass panels, whilst two outer layers at least of the core extend some distance beyond the edges of the glass panels, at least one layer of fibrous material impregnated with plastic setting material being interposed as a reinforcement between the margins of said extending layers of the core and abutting against the edge(s) of said intermediate layer(s) of the core and secured adhesively in position.

2. A laminated glass panel as claimed in Claim 1, wherein further alternate layers of plastic material and of fibrous material impregnated with plastic setting material are built up upon the outer faces of the projecting margins of the extending layers of the core, some of these built up layers abutting against the edges of the glass panels and some of them extending over the outer faces of the margins of the glass panels, all said layers being secured adhesively in position.

3. A laminated glass panel substantially as hereinbefore described with reference to Figure 1 or Figure 2 of the accompanying diagrammatic drawings.

A. L. BING,
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Agent for the Applicants.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Glass Panels.

We, NATIONAL RESEARCH DEVELOPMENT CORPORATION, a British Corporation established by Statute, of 1 Tilney Street, London, W.1, do hereby declare this invention to be described in the following statement:—

This invention relates to laminated transparent panels, such as windscreens and windows for craft and vehicles.

Trouble having been experienced with "safety glass" panels due to rigid bolting of the panels to supporting members, it has already been proposed to mount aircraft windscreens by means of clamping bolts passing through the plastic layer or layers of the glass/plastic sandwich, such layer or layers being caused to project beyond the edges of the glass sheets; although this expedient gave flexibility to the assembly, with consequent protection to the panel against breakage due to vibration, mechani-

cal shock or differential expansion of panel and frame, there remained the danger of tearing of the plastic material and of its deformation due to creep, especially under tropical conditions.

According to the invention, transparent panels are provided with projecting strips of flexible, porous material which are impregnated with plastic material which bonds them to the outer laminae of the panels and is integral with plastic material forming intermediate layers of the panels. The panels are thus provided with projecting fixing members which are flexible but of greater tensile strength and creep-resistance than the plastic strips of the previous proposal. The flexible projecting strips preferably comprise material of a fibrous nature.

An example of a windscreen panel for fit-

ment in an aircraft comprises outer layers of glass secured together by interposed polyvinyl butyral plastic and strips of glass fibre cloth inserted to a short distance between and projecting beyond the edges of the glass sheets; the strips of glass fibre cloth are impregnated with polyvinyl butyral which secures the strips to the glass sheets and forms, with the similar material which secures the glass sheets together, an integral layer of plastic material with fibre-cloth-reinforced projections beyond the four edges of the panel. The projecting strips may be inserted into and clamped by metal frame members, clamping bolts passing through both frame members and the strips.

Where hermetic sealing of enclosures is required, as in a pressurized cockpit or cabin, the projecting strips may be longer than is necessary for fixing purposes, being doubled back upon themselves before insertion of the double portions into the frame channels, the free ends of the strips of neighbouring panels being secured together by polyvinyl butyral or other adhesive in rear of the common frame member.

Dated this 8th day of March, 1950.

T. G. HICKS,
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This drawing is a reproduction of
the Original on a reduced scale.

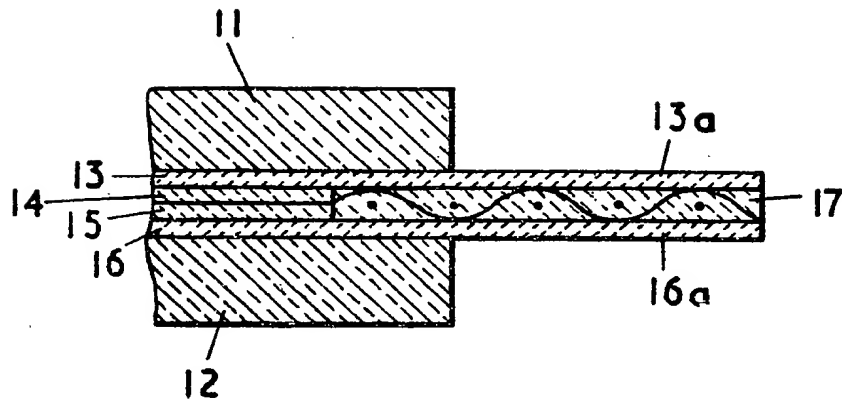


Fig. 1.

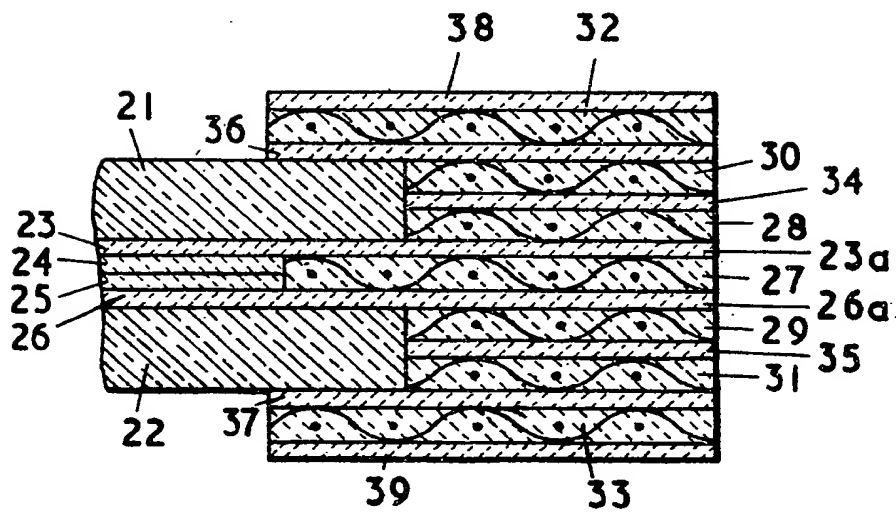


Fig. 2.